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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,695	10/27/2003	young Sung Yoo	DYA-0010	3916
7590		09/05/2006	EXAMINER	
Michael A. Cantor		PARSONS, THOMAS H		
55 Griffin South Road		ART UNIT		
Bloomfield, CT 06002		PAPER NUMBER		
		1745		
DATE MAILED: 09/05/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/694,695

Applicant(s)

YOO ET AL.

Examiner

Thomas H. Parsons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

This is in response to the Amendment filed 12 July 2006.

(Previous) DETAILED ACTION

Drawings

1. The objection to the drawings as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description has been **withdrawn** in view of Applicants' Amendment.

Specification

2. The objection to the disclosure because of minor informalities has been **withdrawn** in view of Applicants' Amendment.

Claim Rejections - 35 USC § 112

3. The rejection of claims 1-23 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been **withdrawn** in view of Applicants' Amendment.

Claim Objections

4. The objection of claim 3 because of minor informalities has been **withdrawn** in view of Applicants' Amendment.

Response to Arguments

5. Applicant's arguments with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection.

DETAILED ACTION

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 3, 4, 6, 7, 9, 10, 13, 14, 15 and 17 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 3, 4, 6, 7, 9, 10, 13, 14 and 15, the addition of the word “type” to an otherwise definite expression extends the scope of the expression so as to render it indefinite because it is unclear what “type” is intended to convey. See MPEP § 2173.05(d). Claim 17 is rejected because it is dependent upon rejected claim 3.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoo et al. (6,593,020) in view of Shiratori et al. (5,368,951).

Claim 1: Yoo et al. in Figures 2 and 7 disclose a solid oxide fuel cell which is characterized in that a solid oxide fuel cell having a fuel electrode (1), an electrolyte (2), and an

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air electrode (3) is produced, wherein four sides or opposite two sides of corners of a single cell (4) are downwardly bent in an inverted U shape (33) (col. 6: 20-col. 13: 30), and separate gas channels are disposed on a surface of an air and on a surface of a fuel electrode.

Yoo et al. do not disclose gas channels formed in an inner side and/or an outer side of the single cell.

Shiratori et al. in Figure 1 disclose a separate channel (distributors 5, 6) formed in an inner side and/or an outer side of the single cell (unit cell 9)(col. 2: 12-44 and col. 3: 57-61). However, Shiratori et al. further disclose a fuel cell that does not have separate distributors but has air electrodes and fuel electrodes which also functions as air distributors and fuel distributors (col. 3: 57-61) (i.e. distributors integrally formed in an inner side or an outer side of a single cell).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the single cell of Yoo et al. by incorporating the gas channels of Shiratori et al. because Shiratori et al. disclose gas channels that would have distributed air and fuel entirely and evenly to the electrodes thereby improving the overall performance and efficiency of fuel cell stacks.

Claim 2: Yoo et al. in Figure 2a disclose a single cell having a porous fuel electrode support having a triple film or multiple films in which an electrolyte (12) is densely coated on or in the entire upper surface of the flat plate (31) and the entire portions of the bent portion (33) and support or a part portion of the same in a single cell in which corner portions (32) are downwardly bent in the vertical direction, and a porous air electrode (3) is coated on the upper portion in which the electrolyte is coated (col. 6: 20-col. 13: 30).

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Yoo et al. do not disclose gas channels in an inner side and/or an outer side of the single cell.

Shiratori et al. in Figure 1 disclose a gas channel (5, 6) formed in an inner side and/or an outer side of the single cell (unit cell 9)(col. 2: 12-44 and col. 3: 57-61).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the single cell of Yoo et al. by incorporating the gas channels of Shiratori et al. because Shiratori et al. disclose gas channels that would have distributed air and fuel entirely and evenly to the electrodes thereby improving the overall performance and efficiency of fuel cell stacks.

Claim 3: The rejection of claim 3 is as set forth above in claims 1 and 2 wherein further Shiratori et al. in Figure 1 disclose a gas channel formed in a straight line structure.

Claim 4: Because the gas channel in the fuel electrode of the Yoo et al. combination is structurally similar to that which is instantly claimed, it obviously would provided a cross morphology of a straight-line shaped or lattice shaped gas channel formed in the fuel electrode substrate of the single cell that includes a trapezoid shape in which a rectangular, circular, or rectangular protrusion is formed at an obtuse angle.

Further, it would have been an obvious design choice to one with ordinary skill in the art at the time of the invention to modify the downwardly bent portions and the straight structure of gas channels formed in a u-shape to a trapezoid shape in which a rectangular protrusion is formed at an obtuse angle and an acute angle or a structure in which rectangular, polygonal and/or circular protrusions are combined in a combined structure for thereby operating as gas channels, since the applicants have not disclosed that this particular shape provides any criticality

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and/or unexpected results and it appears that the invention would perform equally well with the shape as taught by the Yoo et al. combination.

Further, Yoo et al. in Figures 2 and 7 disclose cross sections of the downwardly bent portions (33) and the straight structure of the gas channel formed in the fuel electrode support formed in a u-shape.

Claim 5: Yoo et al. in Figure 2b disclose a single cell (4) formed of a triple layer or multiple layer porous air electrode support in which an electrolyte (2) is densely coated in the entire portions of the lower surface of a flat portion (31) in which an end portion is vertically and downwardly bent (33), and in the entire portions or a partial portion of the bent portion and the support, and a porous fuel electrode (1) is coated on the lower portion on which the electrolyte is coated (col. 6: 20-col. 13: 30).

Yoo et al. do not disclose gas channels in an inner side and/or outer side.

Shiratori et al. in Figure 1 disclose a separate channel (distributors 5, 6) formed in an inner side and/or an outer side of the single cell (unit cell 9)(col. 2: 12-44 and col. 3: 57-61). However, Shiratori et al. further disclose a fuel cell that does not have separate distributors but has air electrodes and fuel electrodes which also functions as air distributors and fuel distributors (col. 3: 57-61) (i.e. distributors integrally formed in an inner side or an outer side of a single cell).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the single cell of Yoo et al. by incorporating the gas channels of Shiratori et al. because Shiratori et al. disclose gas channels that would have

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distributed air and fuel entirely and evenly to the electrodes thereby improving the overall performance and efficiency of fuel cell stacks.

Claim 6: The rejection of claim 6 is as set forth above in claims 1 and 5 wherein further Shiratori et al. in Figure 1 disclose a gas channel formed in a straight line structure.

Claim 7: The rejection of claim 7 is as set forth above in claims 1 and 5 wherein further the Yoo et al. combination discloses the claimed invention except for wherein cross sections of the downwardly bent portions and the straight structure or the lattice structure of gas channels formed in the air electrode support are formed in a trapezoid shape in which a rectangular protrusion is formed at an obtuse angle and an acute angle or have a structure in which rectangular, polygonal and/or circular protrusions are combined in a combined structure for thereby operating as gas channels.

However, because the gas channel in the fuel electrode of the Yoo et al. combination is structurally similar to that which is instantly claimed, it obviously would provided a cross morphology of a straight-line shaped or lattice shaped gas channel formed in the fuel electrode substrate of the single cell that includes a trapezoid shape in which a rectangular, circular, or rectangular protrusion is formed at an obtuse angle.

Further, it would have been an obvious design choice to one with ordinary skill in the art at the time of the invention to modify the downwardly bent portions and the straight structure of gas channels formed in a u-shape to a trapezoid shape in which a rectangular protrusion is formed at an obtuse angle and an acute angle or a structure in which rectangular, polygonal and/or circular protrusions are combined in a combined structure for thereby operating as gas channels, since the applicants have not disclosed that this particular shape provides any criticality

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and/or unexpected results and it appears that the invention would perform equally well with the shape as taught by the Yoo et al. combination.

Claim 8: Yoo et al. in Figure 2c disclose a single cell (4) formed of an electrolyte support (2) formed of a triple layer or a multiple layer in which a fuel electrode (1) is coated in a lower portion of a flat portion (31) in which an end portion is vertically and downwardly bent (33), and an air electrode (3) is coated on an upper portion of the electrolyte (col. 6: 20-col. 13: 30).

Yoo et al. do not disclose gas channels in an inner side and/or outer side.

Shiratori et al. in Figure 1 disclose a separate channel (distributors 5, 6) formed in an inner side and/or an outer side of the single cell (unit cell 9)(col. 2: 12-44 and col. 3: 57-61). However, Shiratori et al. further disclose a fuel cell that does not have separate distributors but has air electrodes and fuel electrodes which also functions as air distributors and fuel distributors (col. 3: 57-61) (i.e. distributors integrally formed in an inner side or an outer side of a single cell).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the single cell of Yoo et al. by incorporating the gas channels of Shiratori et al. because Shiratori et al. disclose gas channels that would have distributed air and fuel entirely and evenly to the electrodes thereby improving the overall performance and efficiency of fuel cell stacks.

Claim 9: The rejection of claim 9 is as set forth above in claim 3.

Claims 10: The rejection of claim 10 is as set forth above in claim 7.

Claim 11: Yoo et al. in Figures 2 and 7 disclose one or more electrolytes selected from the groups comprising ZrO_2 group, CeO_2 group, Bi_2O_3 group, lanthanum perovskite group are

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coated and heat-treated in a support in which four sides or opposite two sides of corners are downwardly bent in an inverted U shape for thereby producing an electrolyte having a thickness of about 5 μm through about 50 μm , and the support is formed of a triple layer structure or a multiple layer structure in which an air electrode is coated on an upper portion in which the electrolyte is coated, and a fuel electrode is coated in a lower portion in which the electrolyte is coated (col. 6: 20-59). See also col. 6: 20-col. 13: 30.

Claim 12: Yoo et al. in Figures 2 and 7 disclose an electrolyte plate produced in a structure in which four sides or two sides of corners are downwardly bent in an inverted U shape using an assembling powder of about 10 μm through about 100 μm using one or more solid oxide electrolyte materials selected from the groups comprising ZrO_2 group, CeO_2 group, Bi_2O_3 group, and lanthanum perovskite group, and the electrolyte support is implemented in such a manner that the single cells formed by coating a fuel electrode in a lower portion of the electrolyte flat portion and an air electrode in an upper portion of the electrolyte are formed in a triple layer or multiple layer structure (col. 6: 20-59). See also col. 6: 20-col. 13: 30.

Claim 13-15: The rejections of claims 13-15 are as set forth above in claim 7.

Claim 16-21: The rejections of claims 16-21 are as set forth above in claim 11.

Claim 22-23: The rejections of claims 22-23 are as set forth above in claim 12.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas H. Parsons whose telephone number is (571) 272-1290. The examiner can normally be reached on M-F (7:00-4:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER

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Art Unit 1745
